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# SEA-ISLAND AND MEADE COTTON IN THE SOUTHEASTERN STATES

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## INTEREST IN SEA-ISLAND COTTON

The question of resuming the production of sea-island cotton is being raised, especially in Georgia and Florida, on account of the low prices for short fiber, following the largest crop in the history of the American cotton industry. Relatively high prices are now being paid for the long staples, showing that there has been a recovery from the years of economic depression after the war, when there was practically no market for the long staples.

The object of the present circular is to call attention to the facts that should be considered in any attempts that are made to produce sea-island cotton or other extra-length staples in the Atlantic coast districts of South Carolina, Georgia, and Florida.

Responding to the price difference, farmers in Georgia and Florida probably could be induced to plant several thousand acres of sea-island cotton in the coming season, but stocks of good seed are not available for large commercial plantings. Even on the Sea

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Islands of South Carolina, where the seed stocks formerly were maintained, the farmers have not grown sea-island cotton for several years. Provision must be made for adequate supplies of pure seed before production can be resumed on a commercial scale. It is out of the question to produce good sea-island cotton from mixed stocks of seed.

The lack of seed stocks will prevent a stampede to sea-island cotton, but in view of the renewed interest in this type of cotton there is need of information regarding the precautions that will be necessary if a regular production of the sea-island or some other type of long-staple cotton is to be reestablished in the southeastern districts. Changing frequently from one type or variety of cotton to another is a wasteful policy and interferes with improvements of production that are greatly needed in the cotton industry. In the southeastern coast-plain districts there is a special need of placing the production of cotton on a better footing than in the past. These districts have special qualifications for producing long-staple cotton, but the full possibilities of utilizing superior varieties are not to be attained unless the system of production can be improved.

It should not be inferred from the large crop of cotton in 1926 that the boll weevil is no longer a menace, and that the former production of sea-island cotton can be restored under the old system.

Growers should remember that for several years before the arrival of the boll weevil, sea-island cotton was not profitable, on account of the low prices that were paid. Several years before the war-time advance in the cost of production it was recognized that the growing of sea-island cotton could not be continued at prices below 30 cents a pound, whereas the market held around 23 cents, even for the best sea-island fiber. Some of the growers held their crops for several seasons, while some were ruined and left their plantations. Others turned to short-staple upland varieties, with a resulting contamination of the seed stocks of the sea-island cotton. When an inspection was made in the fall of 1913, many of the sea-island fields showed many upland plants, and even in the best fields at least a few hybrids were found. On account of the uncertainty regarding the future of the industry, with the boll weevil expected in a few seasons, no organized effort was made to keep up the seed stocks or to improve the market conditions (*6*).[1]

## LACK OF SEED SUPPLIES

Formerly it was practicable for growers in Georgia and Florida to obtain sea-island seed from South Carolina, because there was a regular production of this type of cotton on the Sea Islands near Charleston that continued for more than a century. The selection of special strains of sea-island cotton was a highly developed art, and the precautions used by the sea-island planters have not been equaled in other parts of the world. It is much to be regretted that the stocks of sea-island seed were not maintained on the former basis of careful selection, but were allowed to deteriorate.

[1] Italics figures in parentheses refer to "Litertaure cited," page 19.

The neglect of selection began even before the arrival of the boll weevil. The growers were badly discouraged because for several years they were forced to sell their cotton at very low prices, below the cost of production. With the yields cut down by the boll weevil, and prices remaining very low during the post-war period, it is not surprising that there was a suspension of the growing of sea-island cotton, even in the oldest centers of production, on the islands near Charleston.

Only a little cotton is now being planted on the Sea Islands, and this is limited almost entirely to a locally selected upland variety with an intermediate length of staple, much shorter than the sea-island or Meade varieties, but producing larger crops, and hence more profitable to grow during the years since the war. Most of the roller gins that were used for sea-island cotton have been dismantled and replaced by saw gins for upland cotton.

In the mainland districts the problem of seed stocks has been recognized in the past only to the extent of ordering seed from the islands, so that the mainland growers have not appreciated the difficulties of making such provision for themselves. If production is not resumed on the Sea Islands, the farmers in some other district must take up the question of growing the sea-island cotton apart from other varieties, so that the seed can be kept pure. The question of seed supplies is of fundamental importance in the cotton industry.

The mainland growers of sea-island cotton considered it necessary to purchase fresh seed stocks every two or three years from South Carolina, it being a generally accepted belief that the seed stocks "ran out" rapidly on the mainland. The deterioration of the seed stocks was often ascribed to less favorable conditions in the mainland districts, which made it possible to overlook the chief cause of deterioration, namely, mixing and mongrelizing with short cotton. The mixed seed stocks produced irregular fiber which was difficult to market except at a much lower price than the uniform product grown from pure seed. The production of a good quality of sea-island cotton in Georgia and Florida was dependent upon the isolated districts on the islands where the stocks of pure seed were maintained.

On account of the lack of seed stocks it is not practicable to go back at once to an extensive planting of sea-island cotton in Georgia and Florida. A sustained, organized effort will be required to increase and maintain the seed stocks. This is especially necessary with sea-island cotton because seasons of crop failure must be expected so that reserve stocks of seed should be carried over. The same difficulties must be expected as in establishing a new industry, except that it is known from the past experience that fiber of good quality can be grown if the necessary precautions are taken.

One of the difficulties to be recognized is that on account of the humid climatic conditions in the coast districts the vitality of seed is not to be relied upon for more than two or three years, even under the most favorable storage conditions. Wet weather in the harvest season may impair the quality of the seed or unfavorable spring weather may necessitate replanting, and thus exhaust the seed stocks. To keep adequate reserves of good seed would be one of the necessary precautions for maintaining a sea-island or Meade cotton industry.

The difficulties and failures that were encountered a few years ago with the Meade cotton in Georgia and Florida are the same that must now be expected with the sea-island cotton, unless practical provision is to be made for maintaining the seed supplies.

It is out of the question to produce satisfactory long-staple fiber from stocks of seed that have been mixed with short cotton. The seed stocks must be isolated and ginned separately, in addition to careful breeding and selection of the variety. The precautions are not difficult to apply, but they require the cooperation of all the farmers of a community in order to be effective and to bring the full return.

Under the old system of private plantation gins it was possible for each grower to maintain his own separate stock of carefully selected seed. Some of the growers of sea-island cotton who were most careful of their seed stocks would not sell any seed even at high prices, in order to hold their contracts with European manufacturers to supply a special quality of staple. But after the exclusive contract system fell into disuse and the special stocks of cotton had to be marketed at ordinary prices, the precautions of selection and isolation of the seed stocks were relaxed.

Unless the private gins and the contract system of selling are restored, which does not seem probable, the seed stock becomes a community interest rather than an individual interest. The precautions for production of long staples will be the same in the southeastern districts as those already put into effect in the one-variety communities of the southwestern irrigated valleys. In order to establish and maintain good stocks of seed, only one kind of cotton can be grown in the same neighborhood or sent to the same gin. All of the farmers of the community should have the same kind of seed to plant and the same kind of cotton to sell. The arrangements may be made in different ways, but with the same object of producing and marketing one kind of cotton. All of the cotton of the community becomes more valuable by being of one kind and of uniform quality, and such cotton is much easier to sell at full value. Thus the marketing problems of cotton can be solved very largely in the field of production by unified community action.

## CONDITIONS FAVOR LONG STAPLES

Atlantic Coastal Plain conditions are more favorable for producing long-staple cotton than for obtaining large yields of short staples. Good yields are necessary to render the short staples profitable in competition with other cotton-growing regions. Long staples can be grown in the southeastern districts because the climate and the soil conditions are more equable, but other conditions in the Southeast are less favorable. The crops are often reduced by wet weather or damaged by storms, so that the yield averages are relatively low in the coast-plain counties. Fertilizers are a large item of expense in the Southeast, whereas no fertilizers are used on most of the short cotton produced in Texas and other Southwestern States. Even with the relatively high prices of short staples in recent seasons, cotton growing has not proved to be profitable in the southeastern districts. One correspondent says: "The progress of the

planters in this section has been nil since they abandoned growing sea-island cotton."

On account of the longer growing season and more humid climate of the southern coastal plains, the control of weeds is more difficult and costly than in northern sections of the Cotton Belt or in the Mississippi Valley and Texas. The drier climate of Texas and other Southwestern States is an important factor in weed control as well as in reducing weevil injury.

It is plain that the extra costs of raising the cotton and of protecting the crop against the boll weevil under the humid eastern conditions are better repaid if fiber of superior quality is produced and sold at higher prices in the market. The presence of the boll weevil does not mean that cotton of superior quality can not be grown, but renders it the more necessary to grow good cotton and to sell it at a full price. If the weevils prune off many of the buds, those that remain uninjured may have a better development. Under weevil conditions, especially in the southeastern districts, a high-quality production is more feasible than a low-quality production. Since it is hardly to be expected that these districts can compete successfully in the production of short staples at low prices, it may be urged especially that the growers should consider the raising of good cotton and the marketing of superior fiber at full prices as necessary features of production.

If the farmers of the southeastern districts do not take advantage of their more equable climate for the production of special-length staples, and if market conditions are unfavorable for short staples, the future of cotton growing, especially in the more humid sections, becomes doubtful. The tendency to abandon cotton as soon as other crops can be substituted is apparent in many localities and may be expected to increase unless the southeastern communities can work out their problems of growing better cotton and placing it to better advantage in the market.

For a constructive and satisfactory solution of the marketing problems of long-staple cotton it is necessary to establish and maintain a regular production of superior, uniform fiber, which must be based on careful breeding and guarding of the seed stocks. Precautions of selection, isolation, and separate ginning must be established, and these are practicable only in communities that will limit themselves to the growing of one kind of cotton and make a sustained effort through a period of years so that the necessary market contacts can be established.

## MARKET PROBLEMS OF LONG STAPLES

Account must be taken of special marketing problems of the long-staple cottons in any plan of establishing a regular production of the sea-island, Meade, or other varieties with special-length staple. These difficulties must be recognized and faced as the first step toward working out a better marketing system.

Prices of the long staples are subject to wide fluctuations, partly because there is only a limited use of such cottons, and the market may be oversupplied by adding a few thousand bales to the volume of production. The classing of long staples is a special art and only

a few markets have competent buyers. The long-staple markets open later in the season, and trading in long staples is often suspended in periods of uncertain prices. Farmers who raise their crops on borrowed money and are forced to sell their cotton as soon as it is ginned may find themselves in special difficulties with long staples.

The marketing difficulties and uncertain prices, more than the difficulties of growing the cotton, are responsible for the limited and irregular production of long staples, and also for their restricted industrial use. If the supplies were more regular and the prices less erratic the use of long staples by the manufacturers undoubtedly would increase to a great extent. Assurance of a regular supply would increase the use by manufacturers, and thus be the means of establishing a regular demand, the true relation being contrary to the usual belief that the demand determines the supply. Of course there must be an underlying need or potential demand for the cotton by the manufacturers, but also the cotton must be in actual use before an active competitive demand can develop that will bring out the full value of a superior fiber. The practical point is that the present commercial system does not fully meet the needs of the industry, whether viewed from the standpoint of the farmer, of the manufacturer, or of the consuming public.

In order to establish the production of the long-staple cottons on a regular and safe footing, there is need to establish more direct and responsible relations than have existed in the past between the producers and the consumers. Communities that have a standardized production of one variety of cotton are in a position to establish better relations with the buyers or to sell directly to the manufacturers. Though the solutions of the marketing problems are hardly to be foreseen, the best conditions for taking up these problems undoubtedly are to be found in communities that limit themselves to one variety of cotton, since it is only in such communities that the buyer or the manufacturer can be assured of a future supply of the same kind of cotton.

## ADVANTAGES OF A STANDARDIZED PRODUCT

The organization of communities to grow one kind of cotton is the first step to be taken, if a practical effort is to be made to establish a better system of production and marketing of the cotton crop. The object of community organization is to produce a standardized crop that can be sold at a higher price because it is better cotton and because there is more of the better cotton to sell. Community production of good fiber should not be confused with the efforts that have been made in recent years to form extensive marketing organizations in order to get better prices for cotton as now produced, without undertaking to improve the quality of the fiber.

The very uneven quality of the cotton as produced by the present system, largely from mixed and degenerate seed stocks, is one of the chief obstacles in the improvement of marketing. The varied character of the cotton causes the difficulty and expense of commercial classing of the bales and the risks that the organizations must assume

in employing and guaranteeing the work of the commercial classers. Disputed classifications must be arbitrated and claims adjusted. Such difficulties are unavoidable in mixed-variety production, even with the most competent classing, since the irregular character of the cotton in the bales may not be shown by the samples that are drawn for grading and classing.

The difficulties and expenses of commercial classing can be greatly reduced through a unified system of production—that is, by growing only one variety of cotton in a community and maintaining the purity and uniformity of the seed stocks. These precautions in production standardize the quality of the fiber and give it a greater intrinsic value. Marketing is facilitated because buyers of good staples are attracted as soon as they know that commercial quantities of uniform fiber are obtainable in any community or district. These advantages have been shown in the one-variety communities that have been established in California.

The need of improvement of production, as the best approach to the marketing problems, is being appreciated in other industries, though the one-variety principle seems to have a special application to the cotton industry, because there is an essential need of uniformity in cotton fiber. Uniformity adds greatly to the industrial value of the fiber because better fabrics can be made and because the costs of manufacture are reduced. Uniform fiber means less waste in spinning, and less labor is required. The need of uniformity is greatest with the special-length staples like sea island and Meade.

The ginning and handling of the cotton can be made more uniform when only one variety is grown. Staple cotton must be ginned with special care, and roller gins are needed for the very long staples. The differences in ginning machinery are another reason for holding to one type of cotton in a community. Changing from one type of machinery to another not only is expensive but tends to poorer work. Much of the roller ginning machinery formerly used with sea-island cotton has been dismantled and is not likely to be restored except in localities where there is a prospect of continued production. Even in the picking of the cotton there are advantages in continuing with the same type from year to year. It is difficult to get pickers who are accustomed to the larger bolls of the upland varieties to work on the small bolls of sea-island or Egyptian cotton and to take the extra care that is necessary to keep the long-staple cottons free from "trash."

The experience gained by the farmers in establishing an organized community production is a good preparation for the effort that must be made in order to market the cotton to the best advantage. It is easy to see that a much better basis would exist for general marketing organizations if production were established and improved on a local community basis. In the absence of local experience in community efforts, the farmers have little opportunity to develop practical judgment in dealing with the problems of larger marketing organizations. Since most of the farmers are not in a position to understand the difficulties of conducting the larger organizations, it is not surprising that many of the members become dissatisfied

when the hope of obtaining higher prices is not immediately realized.[2]

## COMMUNITY IMPROVEMENTS OF PRODUCTION

The growers in the southeastern districts should take account of the possibilities of improvement that have been demonstrated in recent years in the irrigated valleys of the Southwestern States where growers have organized for the production of superior fiber by planting only one variety and maintaining the seed stocks. Although it may be more difficult to establish one-variety conditions of production in the southeastern districts, the need of a better system of production is being recognized, and some of the more progressive communities may be ready to consider the advantages of one-variety organization. The reasons for establishing one-variety communities and the precautions that are necessary in maintaining stocks of pure seed are described in a publication of the United States Department of Agriculture which is available for free distribution (*2*).

Active local interest and leadership are the first essentials in establishing one-variety cotton communities, as is shown by several years of experience with such undertakings in the Southwestern States. From the standpoint of the community there is no practical objection to the one-variety plan, though there may be much inertia to overcome. Unless some members of the community are actively interested there is little prospect of getting the facts appreciated by the community as a whole. When it is understood that the farmers of one-variety communities often get from 2 to 5 cents a pound more for their cotton than farmers who grow the same cotton in mixed-variety communities, the folly and waste of the present system of production begin to be appreciated. Such an improvement of production on a unified community basis would add more than a hundred million dollars annually to the value of the American cotton crop.

The history of a one-variety cotton community that was established in 1920 in the Coachella Valley of southern California is in course of publication by the department (*5*).

On account of the special difficulties of producing sea-island cotton in the presence of the boll weevil, the need of community organization of production is even greater than with upland varieties. All of the protective measures that can be used against the boll weevil are more effective if used by all the farmers of a community, and some of them may be of little effect unless the community acts together.

Some farmers are likely to plant much earlier than their neighbors, and the later plantings are more liable to injury by the weevils. In other seasons early plantings may fail to germinate, or the stands may be poor, or the plants may be stunted by long exposure to unfavorable conditions. Hence planting too early is to be avoided as well as planting too late.

The advantage to be expected with moderately late planting, especially of sea-island cotton, is that most of the weevils may dis-

[2] In the report of a recent investigation of cooperative marketing associations for cotton and tobacco, the following statement is made as one of the conclusions: "Members had little appreciation of the marketing services performed by the associations, and little definite knowledge of costs and salaries. Few had definite ideas regarding what may be reasonably expected of a cooperative marketing association."—(*4, p. 28; 8.*)

appear before the plants are old enough to produce flower buds, and until that stage the breeding of a new generation of weevils does not begin. Thus a crop may be produced before the insects can increase to an injurious extent. The greatest protection undoubtedly could be obtained by planting all the cotton of the community as nearly on the same date as possible (*1*).

Later planting dates are rendered more feasible by closer spacing in the rows, so that a rank growth of the plants is avoided. The effect of closer spacing of the plants in the rows, as favoring the development of larger numbers of bolls in the same period of time, is illustrated in the diagram shown as Figure 1. The positions and relative sizes of the stalks and of the two kinds of branches are from detailed measurements of the plants. The positions of the bolls are indicated by figures representing the numbers of locks, the vacant positions showing where buds or young bolls have aborted. On eight close-spaced plants 322 bolls were recorded, while three wide-spaced plants produced only 210 bolls.

Discretion is needed in the use of fertilizers, since a rank growth of the plants tends to later maturity of the crop, and the overgrown plants show more injury in periods of dry weather. More of the buds or young bolls are shed, or the length and strength of the fiber is impaired.

Another object of shortening the period of production is to have the crop harvested early and the plants destroyed at a relatively early date, to stop the breeding of the weevils and reduce their numbers, and thus lessen their chances of surviving the winter.

The need of a complete separation of the sea-island cotton from the upland varieties may be insisted upon, not only to keep the seed from being mixed, but also because the weevils breed earlier on upland cotton, which begins to fruit more promptly than the sea island.

## FRUITING HABITS OF SEA-ISLAND AND UPLAND COTTONS

Comparisons of the fruiting habits of the plants have shown that the period of development of the bolls of sea-island cotton is nearly the same as in upland varieties, though fewer bolls are set in the early part of the season. The upland cottons usually begin to produce fruiting branches at lower joints of the main stalk, commonly at joint 6 or joint 7, while the first fruiting branches of the sea-island cottons usually are found at joint 8 or joint 9, or even farther up the stalk.

Floral buds of sea-island cotton are often aborted while still very small, and many of the lower fruiting branches are very short, often with only one or two joints. The branches remain short because the terminal buds are aborted as well as the flower buds. The sea-island plants usually have 2 or 3 of these short fruiting branches, and often 4 or 5, while upland cotton plants in adjoining rows have the lower fruiting branches much larger, commonly with 5 or 6 joints.

Data that afford a good example of the differences in branching and squaring of sea-island and Meade cottons were recorded on James Island, S. C., July 26, 1922, by W. H. Jenkins. The first five fruiting branches of 10 plants of sea-island cotton showed a total of

85 joints, with 37 flower buds in place, while the corresponding lower fruiting branches of 10 Meade plants had a total of 235 joints, with 84 floral buds or young bolls. Since each joint of a fruiting branch of a cotton plant produces a floral bud, the difference between the varieties appears very striking from the standpoint of feeding and

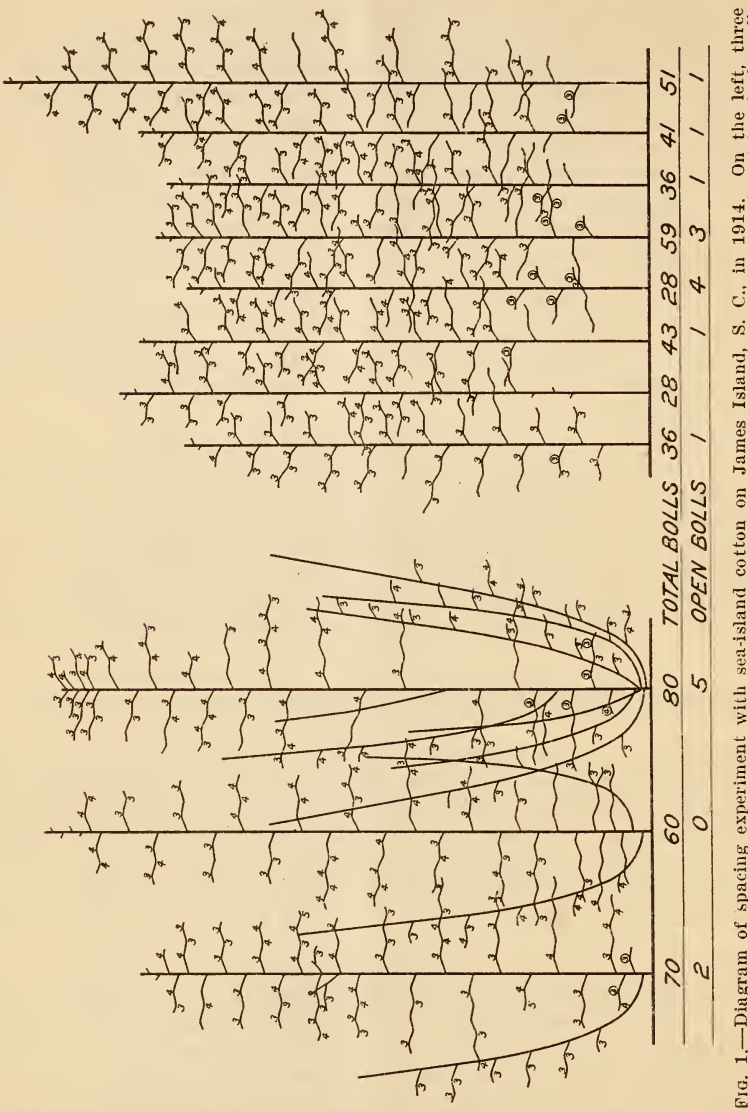


FIG. 1.—Diagram of spacing experiment with sea-island cotton on James Island, S. C., in 1914. On the left, three large plants occupying 45 inches of row space produced 210 bolls by September 10. On the right, eight single-stalk plants in equal row space produced 322 bolls by the same date

breeding of weevils in the early part of the season. About three times as many buds had been shed from the five lower branches by the Meade cotton as by the sea island.

The difference appears even greater when it is considered that the sea-island cotton has a tendency to abort the flower buds while they

are still very small, especially where the plants are left close together in the rows. The dropping of the very small buds leaves fewer to reach the size of being infested by the weevils, so that early in the season there is much less opportunity for the insects to breed on the sea-island cotton than on the upland varieties. Many of the sea-island "squares" are blasted when only one-quarter or three-eighths of an inch long, while the weevils seldom attack buds that are less than half an inch long. Still larger squares are needed to raise weevil larvae to maturity.

In the absence of larger buds the overwintered weevils may feed on buds that are too small to raise larvae, especially if there are only a few buds large enough to feed upon, as may happen in the early stages of sea-island cotton. Thus the breeding of the weevils may be deferred by lack of buds, and by using poison at the right time or by gathering the fallen squares the weevil population may be kept so small that a good crop of bolls can be set.

On account of the differences in fruiting habits, it appears to be more feasible with sea-island cotton than with upland varieties to control the weevils in the early part of the season by gathering and destroying the fallen squares which breed the first generation of weevil larvae. Since there are fewer sea-island squares to collect, the cost is less than with upland cotton, and one or two gatherings of squares may be very effective in delaying the increase of the weevils.

In dry weather there is less need of gathering the fallen squares, since the weevil larvae may be killed by exposure to the sun, especially if the plants are still small, or are narrow and upright, as the tendency is in sea-island cotton when the plants are grown with close spacing. Since the fruiting branches are higher up on the stalks of the sea-island cotton, and the lower branches are shorter, the fallen squares are more exposed to the sun than with upland cotton. But the weather must be dry and the ground clear of weeds if reliance is to be placed on this method of destroying the weevil larvae.

The special danger with sea-island cotton comes later in the season. In several of the experiments good crops of sea-island bolls have been set and grown to maturity before the weevils began to do serious damage. But the crop may still be lost if wet weather is encountered, which keeps the bolls from opening and allows the weevils to destroy them. A week or 10 days of wet weather at the time when the bolls should open may turn a very promising crop into a complete failure.

Consideration of the different habits of growth suggests a breeding possibility for sea-island cotton that may be worthy of experimental study. If a stock could be bred with still more definite tendencies to suppression of the lower fruiting branches or to prompt abortion of the early floral buds, breeding by the overwintered weevils in the spring might be further reduced, or even prevented altogether in seasons that favored such control. While there is little prospect of breeding sea-island stocks that could compete in earliness with upland varieties, there may be a way to utilize the opposite tendency, if the sea-island cotton were grown in separate districts, away from upland cotton.

## SUSCEPTIBILITY TO THE BOLL WEEVIL

As recognized in the preceding pages, the sea-island cotton is more susceptible to the boll weevil in the later stages of development, because the walls of the bolls are thinner and softer than those of upland cotton. Also it is more susceptible in the sense of requiring a longer season to mature a full crop, especially if raised by the former method of wide spacing of the plants which lengthened the crop season more than necessary. From the nature of the facts it is difficult to determine by experiments the greater extent of damage in sea-island cotton, because the tests must be made with the two kinds of cotton close together, and there is no way to give the sea-island full protection against the weevils that the upland cotton may breed, as already explained.

The full-grown bolls of some of the upland varieties have a thick shell and a tough lining of the chambers that render the adult bolls more or less resistant to the boll weevils, but the boll tissues of the sea-island cotton are tender and do not reach a stage of hardening of the walls that protects them from weevil injury. The sea-island bolls remain susceptible through the entire period of development. When the opening of the bolls is delayed by wet weather, even the mature bolls are subject to complete destruction by the weevils. In some seasons the bolls of the sea-island cotton might be protected by poisons, but this would not be practicable in periods of wet weather, which are likely to occur in the coast districts at the critical stage of the fruiting season. This is a chance that the grower must take, unless further means of protection are developed.

The extent to which the weevils could be controlled, if the precautions that are known were developed and applied with scientific care and good judgment by whole communities, has not been determined, because such experiments would require organized efforts by whole communities of growers. Even with upland cotton there has been no complete test of the possibilities of weevil control with all of the factors combined and utilized to the full extent that could be possible if the precautions were applied by simultaneous community action instead of by scattered individual farmers. It can be seen from the nature of the precautions that, while the need is greater with sea-island cotton, the chances of effective control of the weevils are as good as or better than with upland cotton, if the sea-island cotton were grown in separate districts.

Farmers should not be misled by argument about the boll weevil having subsided and no longer being a menace to the American cotton crop. Methods of reducing weevil damage are being applied, and poison is used extensively in some regions, and much cotton is now grown in the drier sections of western Texas and Oklahoma, where the weevil is not a serious factor. But in all of the humid districts the prospect of serious weevil injury must be recognized. The large crop of 1926 is explained by the favorable seasonal conditions in most of the Cotton Belt and the large acreage that was planted, but there is no reason to expect a return to regular high yields in the humid districts. With sea-island cotton a normal invasion of boll weevils might completely destroy the crop, especially with fields of the short cotton in the same neighborhood where the insects could breed and multiply earlier in the season.

## COTTON IN ALTERNATE YEARS

One of the possibilities to consider for a special culture like the sea-island or Meade cotton is that of avoiding weevil injury by planting in alternate years. If communities or districts were organized where one variety could be grown exclusively in an isolated district, as on the Sea Islands below Charleston, alternate-year planting might be considered as a practical possibility. Since the weevils do not live on other plants, no weevils would be bred if no cotton were planted. The raising of full crops of cotton in alternate years would be cheaper and more practical than the raising of half crops every year.

A practical demonstration of the possibility of an alternate-year system of cotton production was found by representatives of the United States Department of Agriculture in a weevil-infested district in southern Mexico in 1907. Though not recognizing the weevil as the limiting factor of production, the native farmers of this district had learned by experience that good crops were not produced when cotton was planted every year, while much larger yields were usually obtained by planting every other year.

There would be no prospect that an alternate-year plan could succeed unless complete cooperation were assured so that cotton would be eliminated in the off years. Also, it would be necessary to have the crop system and the marketing worked out, so that farmers would know what other crops to grow in the no-cotton years. Moreover, a special marketing system would be necessary if a plan of alternate-year production were adopted. A part of the crop would need to be held over, preferably by farmers themselves or by the manufacturers, in order to avoid excessive price fluctuations.

## SEED IMPORTATION RESTRICTED

Many correspondents are suggesting that sea-island seed be imported to meet the present demand, but without recognizing the danger that such importations would involve, and apparently not informed regarding the restrictions that have been establishd to protect the cotton industry against further introductions of dangerous diseases or pests like the boll weevil and the pink bollworm. Many other pests and diseases are known in foreign countries that probably would be very destructive if once brought into the United States and allowed to escape and propagate in our fields.

Sea-island cotton is still grown in the British and French West Indies, as well as in Porto Rico and to a small extent in Peru and in the Fiji Islands, northeast of Australia; but the quality of such seed stocks is not definitely known, and quarantine restrictions against the introduction of plant diseases and insect pests interfere with the importation of such seed into the United States. The introduction of cottonseed is now restricted to small quantities for experimental purposes, which are thoroughly disinfected and grown under quarantine conditions for the first season. There are no methods of disinfection that could be applied to seed in large quantities with any complete assurance against the danger of introducing new pests or diseases.

The idea of importing seed is naturally suggested by the fact that valuable new varieties are sometimes obtained in foreign countries, but such importations are made in small quantities and special seed stocks are developed in the United States. There is no reason to suppose that any seed of value to us could be obtained abroad in large quantities that could be used directly for commercial planting.

All of the principal types of cotton that are produced in commercial quantities in foreign countries have been introduced and planted experimentally in the United States, and those that could be used to advantage have been selected to establish good strains and brought into cultivation, as in the case of the Egyptian cotton in Arizona and the superior upland varieties from Mexico. The Texas big-boll type of cotton was brought from Mexico, and more recently the Durango and Acala types.

The Egyptian type of cotton is not suited to cultivation in the Southeastern States on account of greater susceptibility to the black-arm disease. This has been shown in many comparisons with the sea-island and upland cottons in the Southeast. The black-arm spots are much larger in the Egyptian cotton. In severe cases many of the stalks and branches are girdled and broken off, the plants are defoliated, and very few bolls are produced.

Many of the foreign cottons have shown such abnormal behavior in the early years of planting in the United States that there could be no assurance of satisfactory yields or quality of fiber. It would not be advisable to depend on imported seed, even if no restrictions were necessary.

The former sea-island industry could not be restored merely by planting the former acreages to the variety, if a stock of seed could be brought in. The problem of establishing and maintaining the supplies of seed must be faced as a necessary part of any special cotton industry that is to be established and maintained for a period of years, since it is only on the basis of a regular production that any advantage for the farmers is to be expected from the growing of special crops like the sea-island or the Meade cotton.

## EXPERIMENTS WITH MEADE COTTON

Experiments were made for several years in the growing of a long-staple upland variety called Meade, to replace the sea-island cotton in Georgia and Florida, after the boll weevil had destroyed the sea-island crop. The Meade variety was bred in northeastern Texas, at Clarksville, but proved to be well adapted to the districts in southern Georgia and northern Florida where sea-island cotton had been grown. Experiments in these districts showed that fiber of the same length, and of a quality so closely like sea island as to be practically indistinguishable, could be produced from the Meade cotton, and that under weevil conditions distinctly larger crops could be obtained.

From the standpoint of production and quality of fiber the introduction of the Meade variety appeared very promising, but the successes of the early crops were soon turned into failures by the planting of large quantities of mixed seed and the consequent production of irregular fiber that was heavily discounted in the market, so that it soon became difficult to sell the good Meade fiber at its true value. Much of the good-quality Meade cotton was marketed as sea island,

while the inferor mixed stocks were supposed by most of the buyers to represent the variety.

The failure to establish the production of Meade cotton as a substitute for the sea island was largely the result of the persistent planting of sea-island and short cotton in the same localities with the Meade. The growers did not appreciate the necessity of complete isolation of the fields and separate ginning of the cotton to maintain the purity of the seed stocks and uniformity of the fiber. Careless ginning methods, with consequent mixing of the seed and the crossing of the plants in the field, made it impossible to produce pure stocks of seed and maintain the uniformity in the fiber required by manufacturers. The subsequent marketing of mixed irregular fiber under the name of Meade cotton brought the variety into disrepute among the spinners as well as among the buyers and so increased the difficulties of marketing that farmers were discouraged from planting it.

On the basis of numerous plantings in the sea-island districts it was fully demonstrated that the Meade cotton when grown from pure seed was earlier and more productive than the sea-island cotton and had larger bolls, which are an advantage in picking. The Meade fiber was as long and as good and as uniform in quality as the better grades of sea island that had been produced in the mainland districts. The Meade fiber was practically indistinguishable from the sea island, even by the experts, and the results of spinning tests showed the practicability of substituting the Meade cotton for the sea island in the manufacture of thread and fabrics of the special qualities for which the sea-island cotton was used (*7*).

Since the Meade cotton produces fiber of sea-island character, some of the farmers have considered it as a sea-island variety, although the plant is of the upland type. One of the farmers placed a sign in his field, "Meade sea-island cotton." Recent reports of farmers in Georgia who planted sea-island cotton in recent seasons and obtained satisfactory yields may relate to Meade cotton. While it is not impossible that good crops may be obtained with sea-island cotton, the chances of satisfactory yields are greater with Meade.

## EXPERIMENTS WITH SEA-ISLAND COTTON

At the urgent request of former growers of sea-island cotton on the islands near Charleston, S. C., experiments to determine the possibilities of producing sea-island cotton under boll-weevil conditions were undertaken several years ago by the United States Department of Agriculture. In 1922 a suitable location on James Island was made available for three years by a public-spirited member of the Agricultural Society of South Carolina.

The experiments included studies of the possibility of control of the boll weevil by the single-stalk or thick-spacing method of culture, and also the breeding of early strains of sea-island cotton better adapted to production under weevil conditions. The Meade cotton and other long-staple varieties that were considered as possible substitutes for the sea island were included in these tests, to avoid loss of time in the event that the results of the experiments with sea-island cotton did not indicate practical possibilities.

The results of the experiments under the temporary arrangements of the first three years were of sufficient local interest to war-

rant the purchase in 1925 by the Agricultural Society of South Carolina of approximately 160 acres of land on James Island, of which 100 acres were made immediately available to the department under a cooperative agreement to provide permanent facilities for continuing the experimental work. Cooperation was also arranged with the South Carolina Agricultural Experiment Station through Director H. W. Barre to articulate the experiments conducted on the Sea Islands with the work of the State station in other districts.

It was a part of the agreement with the society to assist and cooperate with the local community in resuming the production of sea-island cotton if the practical possibilities of the crop could be demonstrated. The plan included the holding of reserve stocks of sea-island seed, to be stored in Washington for use by the local community, for reestablishing a center of pure-seed production on the islands. Seed stocks would then be available to other districts where the conditions appeared promising for the sea-island cotton.

It was recognized that no object would be gained by a distribution of seed in small quantities. The only practical use of the seed would be in communities where regular supplies of seed could be established. Such an undertaking should not be limited to one or two seasons. A sustained effort should be planned, with a reasonable assurance of being continued for a period of five years or more that would be required to establish and utilize a local supply of seed.

## YIELDS OF SEA-ISLAND AND MEADE COTTON

The comparative-test plantings of sea-island and upland cotton on the islands near Charleston have now covered a five-year period from 1922 to 1926, inclusive. While the yields that have been obtained in these experiments do not show the full possibilities of sea-island cotton if it were grown in isolated districts, they afford good evidence that the growing of sea-island cotton in proximity with upland cotton is not feasible, at least at prices that have ruled in the period of these experiments.

Table 1 shows the yields of sea-island cotton obtained by the field station of the United States Department of Agriculture in the experimental plots during the last five years and the yields of Meade cotton for four years.

TABLE 1.—*Yields of sea-island and Meade cottons in experiments by the United States Department of Agriculture on James Island, near Charleston, S. C., 1922–1926*

| Year | Acre yields of lint cotton | |
|---|---|---|
| | Sea island (staple 1¾ inches) | Meade (staple 1⅛ inches) |
| | *Pounds* | *Pounds* |
| 1922 | 125 | |
| 1923 | 69 | 255 |
| 1924 | 87 | 297 |
| 1925 | 150 | 203 |
| 1926 | 109 | 231 |

The tests were conducted on James Island, S. C., on land that formerly produced excellent crops of sea-island cotton. The usual poison measures to protect the plants from weevil damage were used on the tests in all cases, to avoid as far as possible the danger that the sea-island plantings would suffer more injury because of the proximity of upland cotton. It is not unreasonable to suppose that larger yields of sea-island cotton might have been obtained if the plantings could have been completely isolated from other cotton, but there is no way to determine how much allowance should be made. Since the arrival of the boll weevil there has been no opportunity to make plantings of sea island under conditions of complete isolation from upland cotton, or to carry such experiments over a series of years, as would be necessary to determine the practical possibilities of production in an organized one-variety community devoted to sea-island cotton.

The yields from the Meade cotton have been much more nearly equal to those obtained from other staple varieties, and the fiber produced from the selected seed of a superior strain developed by the department has averaged uniformly 1⅝ inches in length and is practically indistinguishable from the fine sea-island fiber. But even with the larger yields of Meade cotton, prices of the long staples in recent years have been too low to justify an effort to establish a commercial production.

The cost of labor is still advancing, and greater difficulties are to be expected with sea-island cotton, with pickers who are not accustomed to the small bolls or to the more careful work that is necessary to keep the fiber clean. Among the former growers of sea-island cotton on James Island it is considered that farmers would need to be assured of yields of at least 200 pounds of lint to the acre and of prices around 40 cents a pound in order to have a practical inducement for returning to sea-island cotton. Yields of 250 to 350 pounds of lint per acre were obtained in good seasons in the pre-weevil period, though 200 pounds per acre was considered as a fair crop.

## CONCLUSIONS

Recent tendencies to higher prices for extra-staple cotton, contrasting with the low prices for short cotton of the record-breaking crop of the past season, have stimulated many inquiries regarding the possibility of reviving the production of sea-island cotton in the Coastal Plain districts of the Southeastern States. Many requests have been received for sea-island seed, which could not be furnished. The supplies of seed that growers of sea-island cotton in Georgia and Florida formerly obtained from the Sea Islands of South Carolina are no longer available. Even on the Sea Islands near Charleston there has been a complete suspension of the production of this type of cotton.

Although the boll weevil is considered responsible for the suspension of the sea-island industry, the commercial conditions also were very unfavorable for several years before the arrival of the weevils, and production was declining rapidly. The farmers were discouraged because for several years prices were below the cost of production. The selection of superior strains was not continued, and there was serious danger that the sea-island industry would be

abandoned even before the arrival of the weevil. At the same time the boll-weevil danger prevented any efforts that might have been made to improve the market system.

Studies of the fruiting habits of sea-island cotton show differences from upland cotton, especially in the early part of the season. The early fruiting branches of sea-island cotton are higher on the stalks and have only a few joints. The early flower buds are less numerous, and many of the buds are aborted at very early stages of development before they are large enough to be parasitized by the boll weevil. Thus the sea-island cotton affords less opportunity than upland cotton for the breeding of the weevils early in the season, but the full advantage of this difference is not to be obtained unless the sea-island cotton is produced in separate districts where upland cotton is not grown. The sea-island cotton is more susceptible to the weevil injury at the later stages of development, especially if wet weather interferes with prompt opening of the bolls.

The greater susceptibility of the sea-island cotton to injury by boll weevils is due to the thinner walls and softer texture of the bolls. Experiments have shown that heavily fruited plants of sea-island cotton may have the crop completely destroyed by weevils in a few days of wet weather, while adjacent plantings of upland cotton show much less damage to the bolls. The yields of sea-island cotton have been much lower than those of Meade cotton in four comparisons that have been made from 1923 to 1926. This shows that the full possibilities of sea-island cotton are not to be determined by planting in proximity to upland cotton. Production in isolated communities will be necessary to avoid weevil injury as well as to maintain supplies of pure seed.

In communities that are sufficiently isolated, the growing of sea-island cotton in alternate years, with no cotton in the intervening years, might be a practical method of avoiding weevil injuries. This method is practiced in several cotton-growing districts of southern Mexico.

Frequent change from one type or variety to another is a bad policy which interferes with the utilization of superior varieties of cotton or of improved methods of production.

Provision for the seed stocks is the first essential to maintaining a special industry like sea-island cotton, and is even more necessary under weevil conditions, since failures of the crop must be expected in bad seasons.

A double gin equipment must be maintained if different types of cotton are grown, since roller ginning is required for the extra-length staples. Many of the roller gins have been dismantled in the former sea-island districts and some of them moved for use with the Egyptian cotton now produced in Arizona, so that new equipment or repairs will be needed to resume production.

Excellent results were obtained for several years with the Meade cotton in the former sea-island districts of Georgia and Florida. The plants of this variety are of the upland type, but the fiber has the length and fineness of sea-island cotton. The market reactions with Meade cotton were very favorable until mixed seed was planted and irregular fiber produced, which resulted in a commercial prejudice against the variety. The same deterioration occurs with sea-island cotton if mixing and crossing with upland cotton are allowed.

The causes of the decline of the sea-island industry were investigated by the United States Department of Agriculture, and a publication on the economic features was issued in 1914, four years before the boll weevil reached the Sea Islands below Charleston. In the boll-weevil period many experiments have been made to determine the feasibility of resuming the production of sea-island cotton, but the yields have been too small and the prices too low to give any assurance of profits to the farmers. It is recognized that such a revival is not to be expected unless a different system of production and marketing can be developed to reduce weevil injury, grow uniform fiber, and sell at full prices.

The first step in a practical undertaking must be the establishment of an adequate and regular supply of good seed, which is not likely to be accomplished except by cooperation of growers in a community that will plant only the sea-island cotton. Such an effort must be continued for several years, so that the effects of seasonal conditions can be determined and suitable market relations established. Cooperation would be given by the United States Department of Agriculture to any constructive community undertaking to develop a better system of production of sea-island or Meade cotton and to determine the practical possibilities of the improvements that can be made through community organization of production.

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May 1, 1927

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